Iowa Communications Network

Overview of the ICN

Dedicated to Integrating Technology into Education and Public Services

The Iowa Communications Network

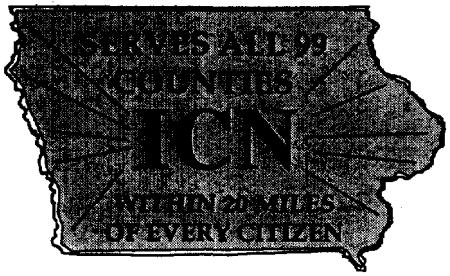
The Iowa Communications Network (ICN) is a statewide, state administered fiber optics network responsible for the transmission of high quality full-motion, two-way, interactive video transmissions, data transport, and long distance voice communications as a tool for distance learning, telemedicine, telejustice, and state and federal agency service needs.

Summary

Overview of the ICN

Until recently, all rural Iowans, while enjoying the amenities of country living, could not reap the benefits of access to extensive curriculums offered by urban high schools, medical specialists, and to the governmental process.

With an 80 percent rural population, a need for equalization of course offerings and media resources between rural and urban educational providers was recognized. The process to develop distance learning projects began in the early 1980's as several community colleges planned and installed separate educational telecommunications networks using a combination of technologies.



To encourage efficiencies and provide distance learning users the capability of communicating with each other, the Legislative Council determined that a coordinated statewide activity was needed. At the same time, several other services including telemedicine and telejustice, requiring telecommunications technologies, were recognized as essential tools for economic development in Iowa's rural communities. These small communities were losing population to urban areas due to lack of sufficient, up-to-date educational and medical services and resources.

Through a series of various plans and requests for proposals, a schedule for Parts I and II of the fiber optics network project was adopted and construction began in 1991. These two phases included installing one fiber optic endpoint per county (99), and an endpoint at each of the three State universities, one at Iowa Public Television, and one on the Capitol Complex for 104 total sites. By early 1994, 49 sites were activated and the remaining 55 Network sites were activated during the following fall and winter. During the 1994 Legislative Session, a bill creating a governing structure and parameters for Part III of the Network was enacted. In 1995, the Iowa General Assembly approved a plan for completion of Part III, as defined by Chapter 8D of the Code of Iowa. Parts I and II of the network provide the backbone of the network and are educational sites.

Currently, there are over 430 video sites connected to the Network. Part III consists of adding over 480 video sites including public and private school districts, area education agencies (AEAs) and public libraries throughout Iowa. In addition to the four-year, Part III additions, other authorized users are connecting more sites to the Network:

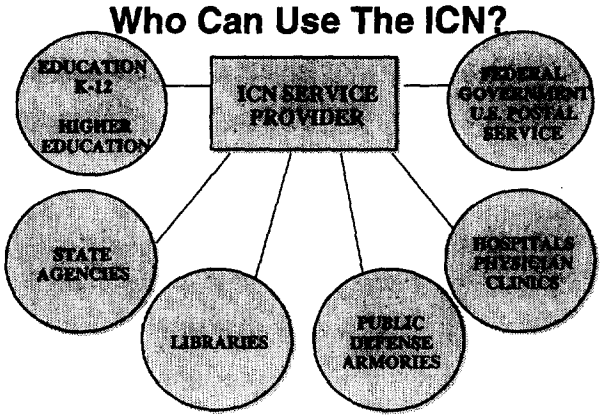
- The National Guard has approximately 60 sites through its Community Lightways Project .
- The federal government has 16 sites and will add 20 more for conducting several pilot projects.
- Hospitals currently have 18 sites and will add 19 more by the end of calendar year 1997.
- The State of Iowa currently has 18 sites and will add another four by the end of calendar year 1997.

First and foremost, lawmakers have stressed that education, though not the only reason for the Network, is the ICN's top priority because the Network was founded to strengthen the quality of education in Iowa.

Who Can Use the Network?

Chapter 8D of the Code of Iowa specifically defines the authorized users of the Network. Authorized users include:

- All accredited K-12 school districts and private schools in the State.
- All accredited public and private colleges and technical educational institutions.
- All State agencies.
- All federal agencies.
- The United States Post Office.
- Hospitals and Physician Clinics (video and data services only).
- Public Libraries.



Benefits offered by the ICN

The ICN was constructed as a tool to provide users throughout the State, including the educational community, the telemedicine community, and State and federal government telecommunications capability for voice, data, and two-way, interactive full motion video to enable increased service. The ICN has accomplished this by equitable pricing for sites throughout the State. Sites are not punished financially by their geographical location. Iowans are using the Network at an increasing rate. During fiscal year 1996, 100,945 video hours were used and it is estimated that 269,000 video hours will be used in FY 1997.

Equalizing Rural Iowa

The "great equalizer" was not built as an economic development tool. However, the ICN is a means with which medicine, education, State agencies and other authorized users can provide more accessible services to Iowans. If the State can demonstrate to companies evaluating a potential Iowa location that the same health, educational, and governmental services found in urban areas are available in rural Iowa, many of the roadblocks to attracting new businesses to the State (specifically rural areas) will be eliminated.

HIGHER EDUCATION INITIATIVES

- **Expand learning opportunities for every community**
- **College and university accredited courses available on the Network**
- **Graduate programs available in numerous locations statewide**
- **Shared K-12 educational research programs using college students as facilitators/sponsors**

This "tool" allows institutions of higher learning to offer courses to the citizenry of rural Iowa that before could only be obtained by commuting. For instance, students in Ft. Dodge and Mason City would have previously commuted two hours each way from the Drake University Campus in Des Moines if they wanted to pursue a Masters of Business Administration degree.

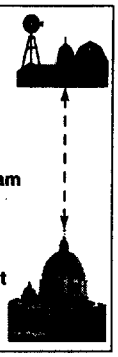
State Government

The State of Iowa is constantly expanding its use of the Iowa Communications Network. Due to the ICN, Iowans outside the Des Moines area are able to interact with State government without going to the State Capitol Complex in Des Moines.

During legislative sessions, public hearings on various issues are conducted over the ICN. Public hearings held in the Capitol Building in Des Moines rarely attract more than a handful of speakers and spectators. A hearing on the reinstatement of the death penalty held in January 1995, attracted hundreds of spectators and two speakers at 19 sites throughout the State.

STATE GOVERNMENT INITIATIVES

- Improved services to Iowa's citizens
- Probation in hearings
- Health education
- Department of Human Services program support services
- Department of Natural Resources environmental education
- Department of Economic Development initiatives



Another example of increased state accessibility is the Department of Economic Development's (IDED) use of the ICN for the Venture Network of Iowa (VNI). VNI brings entrepreneurs and prospective investors together for potential business investments and business development. The ICN allows VNI to extend out statewide and let any potential investor or entrepreneur become involved.

In addition to the regular K-12 ICN sites, the Iowa National Guard has constructed a $10 million project which added over 60 classrooms onto the Network in 55 armories throughout Iowa. These additional sites are available to authorized users when not in use by the Guard for training.

TELEJUSTICE INITIATIVES

- HEARINGS
- TESTIMONY
- APPEALS
- ARRAIGNMENTS

Telejustice

The Iowa Parole Board has been using the ICN for parole interviews and hearings since 1994. The effect is to reduce travel time of the board and its staff and to diminish the transportation of prisoners. These ICN hearings help to reduce the backlog of cases since travel time has been greatly diminished. It has also provided a forum which encourages registered victims to testify who might have been reluctant due to the travel distance or the prison environment. In addition to parole revocation hearings, the Parole Board uses the ICN for inmate interviews, registered victim interaction and public education about parole. With the recent completion of its own classroom, the Parole Board continues to explore additional uses for the ICN and the criminal justice system.

The Parole Board held its first ICN parole interview on July 14, 1994. As of February 1997, the Iowa Parole Board Judges have conducted over 200 parole revocation hearings. With the use of the ICN the Iowa Board of Parole Judges are able to conduct revocation hearings satisfying the needs of parolees, defense counsel and parole officers.

State judicial offices, located in Cedar Rapids, Anamosa and Des Moines, are also in the process of being connected to the ICN. These connections will allow another level of the judicial process to to become more efficient and effective for all parties involved in a judicial infraction (for information on federal telejustice initiatives see page 5).

Telemedicine

Telemedicine users have demonstrated how a difficult diagnostic procedure, with a heart patient in the small town of Jefferson, can be carried out via consultation with specialists at Iowa Methodist Medical Center in Des Moines. Information from angiograms are sent over the screen along with a simultaneous image of the patient's general practitioner doing the examination and verbally reporting his findings to the specialist. Telemedicine also allows several small hospitals to share specialists and techniques in pathology, radiology, etc. with test results being sent over data circuits.

TELEMEDICINE

- PATHOLOGY
- RADIOLOGY
- CARDIOLOGY
- TRAINING/EDUCATION
- PATIENT CONSULTATION

In 1992, Mercy Hospital/Medical Center in Des Moines and Mercy Health Services Iowa/Indiana Region, formed an alliance, Midwest Rural Telemedicine Consortium (MRTC). Currently in Iowa, the MRTC has 18 medical sites connected to the ICN. With a recently awarded $2 million grant received from the Office of Rural Health Policy, the MRTC will expand to an additional 19 locations throughout the State before the end of 1997.

The University of Iowa Hospitals and Clinics are now connected to sites in a clinical telemedicine project. This project is designed to provide telemedicine services to prisons and county hospitals; reducing the travel requirements for patients, both civilian and imprisoned. Presently, the clinic sees imprisoned patients from Iowa Medical Classification Center in Oakdale and the Iowa State Penitentiary in Fort Madison. Telemedicine consultations are offered in the areas of orthopedics, internal medicine, dermatology and cardiology. It is anticipated that by the end of this year Van Buren County Hospital and the five other correctional facilities will use the clinical telemedicine project.

Iowa Health Systems through Iowa Methodist Medical Center in Des Moines focuses telemedicine uses on medical treatment for children and adolescents. For example, the ICN is used to bring a patient/student's teacher in line with her heathcare providers and treatment program after the patient has suffered from a brain injury.

In addition, little lives are saved by using the telemedicine technology platform available in the area of pediatrics. In the case of premature babies at Blank Children's Hospital, the neonatologist pediatric specialist is available, instantaneously, from the University Hospitals in Iowa City to the pediatrician in Des Moines.

K-12 Education

K-12 EDUCATION

- Interactive Classroom
- Computer Access
- Worldwide connectivity for foreign language student interaction
- Interactive computer-assisted training on individualized basis
- Internet connectivity for writing and other educational interactive activities

TECHNOLOGY INTEGRATION

Imagine a classroom where an estimated 4,000 elementary students and 300 teachers from across the State are able to talk with a famous author/ illustrator of children's books. Such an event took place in December 1995 when author Jan Brett interacted with students via the ICN.

By being connected to the ICN, students throughout Iowa will be able to share teachers, resources and even classes. Smaller schools will now be able to offer their students classes that normally wouldn't be available due to the lack of teachers and/or resources. The schools will be able to hold the classes over the ICN.

Hancher Auditorium at the University of Iowa recently conducted a second interactive class over the ICN. World renowned jazz musician, Wynton Marsalis gave a lecture about his creation of "Blood in the Fields." Students were able to ask questions and interact with the performer.

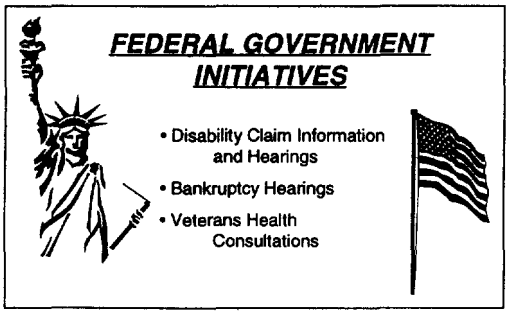
SILO
State of Iowa Libraries Online

Public Libraries

Over 80 public libraries are scheduled to be connected to the ICN for video services by June 1999 as a portion of the Part III project. As applications in education become more numerous, the ICN classrooms located in educational institutions will be less available to other users. The libraries will be available to provide authorized users of ICN video service another location for their sessions. Libraries

can also provide a source within their facility for Iowans to access Internet which supports the libraries' mission of providing access to information. Currently six libraries are connected to the ICN: Belle Plaine, Belmond, Marion, Orange City, Pleasant Hill and Davenport Public Libraries.

The State Library created SILO (State of Iowa Libraries Online) in 1996. SILO is a statewide library information network that helps provide equal access to information to all Iowans, regardless of where they live. SILO uses the Internet, via the ICN, to make thousands of online databases available to libraries, as well as the online catalogs of other Iowa academic and public libraries. SILO also allows libraries to directly request materials from other libraries.



Federal Government

The federal government is using the ICN as a test bed to fine-tune programs designed for the "Nationwide Information Highway." These programs demonstrate how the uses of advance telecommunications services can be applied to improve the quality of services to the public.

Beginning the third phase of the federal project, the General Services Administration (GSA) has administered over $9 million for the first two phases and $10 million for the third. The Social Security Administration is utilizing a demonstration project by conducting disability hearings and processing some initial disability claim interview information over the Network. Interaction between locations in Ottumwa, Des Moines and West Des Moines; with links to Kansas City and Washington D.C. will substantially shorten the time required for the disability claim process. Projects for Veterans Administration have also been developed.

Projects selected for the third phase of the federal project sponsored by the GSA include various initiatives to assist disabled persons, support agriculture, help law enforcement agencies, promote electronic commerce, expand Iowa telemedicine services, and generally aid federal agencies servicing Iowans. Projects also were selected which will connect additional sites to the Indian Hills Community College Multipurpose Video Conferencing Center in Ottumwa, expand the access of the U.S. Courts to the ICN and help schools and government offices gain access to the Internet.

Two federal courthouses, one in Des Moines and one in Davenport are connected to the ICN. Bankruptcy hearings from the courthouses are taking place over the ICN. Often times judges are called to hear a motion regarding a bankruptcy case which may only take minutes - but require up to four hours of driving. Use of the ICN reduces travel time for judges, ultimately reducing their workload and increasing efficiency. By using the ICN the Federal Court saved $37,107 in travel and daily costs in a nine month time period.

Further pilot projects are being developed for the utilization of the Network for criminal procedures. However, utilization of the Network for criminal procedures does require agreement from both sides of the case. Other initiatives for federal use of the ICN include connections with the Veterans Hospitals in Des Moines, Iowa City, and Knoxville; Ottumwa Regional Health Facility; Indian Hills Joint Facility in Ottumwa and the General Service Administration in Washington, D.C.

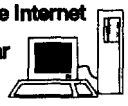
EDNET

ICN Frame Relay for Internet

In November 1995, the Iowa Communication Network's (ICN's) *EDNET* established DS-3 connectivity to the Internet Backbone. The ICN's EDNET is available for Internet support to authorized users. At the end of June 1996, there were four switches connected in merged area, 2, 6, 10, and 11, with merged area 13 and 15 scheduled for installation in FY 1997.

INTERNET SERVICES

- **All authorized users can access Internet**
- **Frame relay switch in each of the Part I sites within 4 years**
- **DS-3 Connection to the backbone of the Internet**
- **Aggregate K-12 schools this Fiscal Year to the AEAs**



The deployment of the EDNET's Network switches is presently a parallel project to the Part III project and will be complete in 1999. A Cascade 9000 Frame Relay Switch will be installed at each of the 15 Part I sites in the same time frame as Part III Merged Area sites are connected. During this four-year transition period, the school districts will employ a variety of Network methodologies to reach their area education agency (AEA) within the State. Each school district's Network solution to reaching their AEA is unique and requires coordination between the site and the ICN staff.

The ICN has been advised by the educational community to be able to provide full interactive access to the Internet for all educators and students. Based upon the research and current practice in many parts of the United States, the ICN recommends a direct connection from a district local area network (LAN) to the Internet. This recommendation is based on the following:

- It is the most cost effective.
- It provides for sharing expensive hardware resources.
- It provides for sharing software resources.
- It allows for local and world-wide communication.
- It provides for high speed access and response.
- It is the most efficient.

Instead of using a regular phone line, which is limited to 28,800 bits per second under the best conditions, a direct connection (lease line or frame relay) can connect networked computers to the Internet at speeds ranging from 56,000 bits per second to 1.5 million bits per seconds (that's 48 times faster than the fastest modem currently available). These connections allow for multiple users to access the Internet at high speeds through a local area network (LAN) in school buildings or a wide area network (WAN) in their district.

Enterprise Messaging

The ICN recently introduced a new service for all authorized ICN users called IowaHub. With IowaHub, all ICN users who chose to subscribe, will be able to send and receive e-mail messages from their own mail system to a disparate mail system and reply by routing the e-mail through the IowaHub.

IowaHub offers a synchronized enterprise wide directory of all subscribers. All IowaHub users will be able to access a directory that contains the names and e-mail addresses of all the other subscribed users. For users of the IowaHub, this could potentially mean access to the e-mail address of any authorized user across the state of Iowa.

The IowaHub will also support attachments, and document translation into the receiver's own word processing format. This

means if a user with Microsoft Word receives an e-mail message with an attached document written in WordPerfect, the attached document would automatically be translated into the receiver's word processing program.

The Importance of Information Technology

Technology provides the building blocks for the Network. Fiber optics and DS-3 circuitry technologies were chosen for their flexibility, capacity and efficiency. The ICN is unique technologically for several reasons, which are described.

Interactive Video Switching

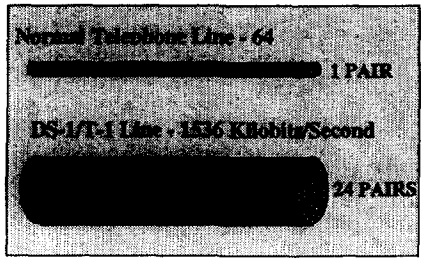
First, was the evolution of the interactive video switching platform. One educational community requirement of the Network was the ability of more than two sites to participate in a session. The interactive video switch allows that to happen. These switches are the mechanical traffic cops of the Network. For example, when a student presses the button on the microphone in Vinton, Iowa to alert the teacher in Cedar Rapids, Iowa (30 miles away) that he wants to ask a question, the teacher is signaled there is a question and a camera in the distant classroom automatically positions itself to the area where the microphone is located.

A psychology class originating at Kirkwood Community College in Cedar Rapids allows participants in Vinton, Washington, and Iowa City to ask questions. During a question and answer session, the instructor and the students at each location can see the student in Vinton who is asking the question. The Network has also accommodated a telemedicine informational session with 100 different sites connected simultaneously.

Common Backbone Transport System

A second reason the Network is technologically unique, is the Network's ability to multiplex all services into a common backbone transport system. This means that data, voice and full-motion, two-way interactive video information share the transport system. A planned future upgrade to an ATM (Asynchronous Transmission Mode) based system will allow voice, video and data to share the same virtual circuit. Although many commercial long distance carriers use DS-3 lines, many rural local carriers use copper or T-1 lines to transmit information. The difference in the lines is the capacity which impacts clarity. T-1 lines can carry voice and data signals but at much slower speeds. DS-3 lines have greater capacity which enables full motion.

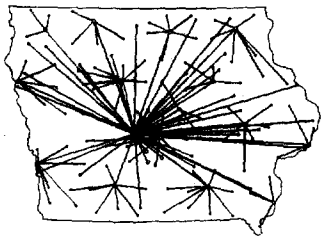
Data Transmission Capacity



The educational community required the capability to link more than two sites per session. The evolution of the interactive switching platform allowed for the ability to multiplex. The transport system also allows capacity for authorized users a dedicated 56K or T-1 circuit for Internet access. This allows ICN Internet users speed of access available to the majority of users who have dial-up access. Synchronization, as provided by DS-3 circuits, is necessary, for example, in music lessons and in the instruction of foreign language where timing is of the essence. Since the main purpose of the Network is to facilitate distance learning, full motion, two-way, interactive video was necessary and the decision to use the DS-3 signal was made. Legislators also decided that all sites, whether rural or urban in Parts I and II of the Network, would have consistent capabilities.

Frame Relay

The Cascade Switch, a "traffic cop" for data transportation, furnishes the capability for the Network to provide frame relay service. Frame relay service is a communications method for connecting computer systems (Local Area Networks, LANs) via data routers and switching data more efficiently by use of the Cascade Switch. The data is divided and compressed into packets of information allowing more than one connection to access the same physical circuit simultaneously.



Connection into a frame relay cloud requires a Frame Relay Access Device (FRAD, i.e. router) and a line from the customer site to a local access carrier's frame relay point of entry, as an example, a frame relay switch like the ICN's Cascade STDX 9000 at STARC Armory. Packets of information from multiple users are multiplexed over the single dedicated line to the frame relay network where they are sent to one or more destinations. Connectivity is achieved by using Permanent Virtual Circuits (PVCs). Besides the economies realized by the use of frame relay service, the equipment used allows more thorough monitoring of circuits.

By using frame relay service, the ICN is able to aggregate large volumes of data traffic onto multiple T-1 backbone links. Up to 125 users can be combined onto a single link, whereas only 24 users can be aggregated using standard point-to-point connectivity. The dividing and compressing of data into packets does not effect the service quality. Since mid-1994 the ICN has installed a total of 563 agency PVCs onto the Network. Of that, 476 are in a partnership with U.S. West. Agency users include the Lottery, Department of Human Services, Department of General Services, Department of Public Safety, Department of Employment Services, Vocational Rehabilitation, and Judicial. The number of PVCs will soon increase by more than 200. Types of usage include full mesh connectivity of the Judicial districts amongst themselves as well as back to the Judicial mainframe in the Capitol Complex.

DMS 500 Switch

The ICN is able to offer authorized users the capability of receiving discounted rates for voice and data services in a more timely and efficient data processing system. The Digital Multiplex System (DMS) 500 switch is the heart of the ICN's voice, data and dialable wideband video services. Without this switch the ICN would not be able to offer our users such efficient and inexpensive service.

The DMS 500 Switch takes in traffic from the authorized user and then redistributes it to either a long distance (interexchange) carrier such as MCI or Sprint or to a local exchange carrier such as GTE or US West. The ICN acts as a n interface by bundling an unlimited amount of voice and data traffic into groups and then sending it to the designated vendor. By using the ICN to bundle all the traffic, authorized users are given a lower "high volume use" rate.

The DMS 500 also allows the ICN to offer a dialable wideband (T-1) video service. This type of video is compressed video. It uses a T-1 connection to transmit an image through digitalchannels. Dialable wideband video is less expensive form of video transmission; however, it is less capable than full motion. This is the technology that telemedicine users such as hospitals and clinics utilize for cardiology, radiology and pediatric consultations. Physicians and specialists are able to view a patient on video and at the same time, read the signs on the data connection without having to travel long distances for a consultation.

Originality

Iowa did not plan to become the only state that is an owner of a utility service. The request for proposal (RFP) for Parts I and II of the Network allowed vendors to submit proposals to lease capacity on existing fiber or to construct the fiber optic cable lines. The RFP allowed vendors to bid construction on all or a geographical portion of the State. Only two bids were received and both were for construction of the Network only. The State became the owner of the ICN by default. There have been advantages to owning the Network. The State does not have to rely on a network owned by another organization to provide needed tools for the educational community and other users. The ICN has been designed to meet the needs of the users, not the uses fashioned around an available network.

The application of the fiber optic technology in Iowa is original because:

- Iowa is the only state to provide statewide DS-3 service with a presence in every county.
- The ICN provides a flat, urban rate to sites throughout the entire state.
- The ICN has the ability to interconnect T-1 compressed video with DS-3 full motion video.

A Success Story

The application has achieved many of its goals. There is at least one point of presence in every county. However, the Network is not complete. Parts I and II of the Network became operational in November 1993 with additional sites added weekly. The Code of Iowa calls for Part III which will connect 480 sites, mainly K-12 schools and libraries throughout the State. The plan signed by the Governor on May 31, 1995, is a 4-year implementation which began June 1, 1996. It is a seven-year lease for 447 of the sites and ownership of 35 of the site connections. Leases for Part III are with a number of private vendors and are on site-by-site or merged area basis. This part of the Network is vital in order to complete the goal of providing video connection in every school district throughout the State.

Although awards were not a goal of the Network, receipt of awards does indicate a measure of success. Network World, a newsweekly of network computing, awarded the State of Iowa its 10th Annual User Excellence Award in November of 1994. The ICN was also recognized in the December 19, 1994, Newsweek magazine. The ICN has hosted several international delegations from Japan, Korea, Spain and New Zealand.

The ICN is dedicated to the integration of technology in the classroom and the services provided to Iowans. Iowa is positioned to be a leader in the transition of bringing its population into the information age. In a fast paced, ever-changing world where most fall behind in the race against change and technology, it is reassuring to know the ICN, in cooperation with Iowans from throughout the State, will allow Iowa to remain competitive in the information age.

ICN™

Updated April 1997

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IOWA COMMUNICATIONS NETWORK

Fiscal Year 1996
Annual Report

DEDICATED TO INTEGRATING TECHNOLOGY INTO EDUCATION AND PUBLIC SERVICES

December 1, 1996

The Honorable Terry E. Branstad
Governor, State of Iowa
State Capitol
Des Moines, Iowa

Dear Governor Branstad:

I am pleased to submit the Iowa Communications Network's (ICN) first Annual Report to you, the General Assembly and the taxpayers of Iowa. This report reflects the history of the ICN as well as the many successes we have achieved during Fiscal Year 1996. It is divided according to services offered by the ICN highlighting successes within each service.

Iowa is pioneering the future of integrated technology by using the ICN as a tool for education and public service. This report focuses on a few of the many partnerships achieved through the ICN's services.

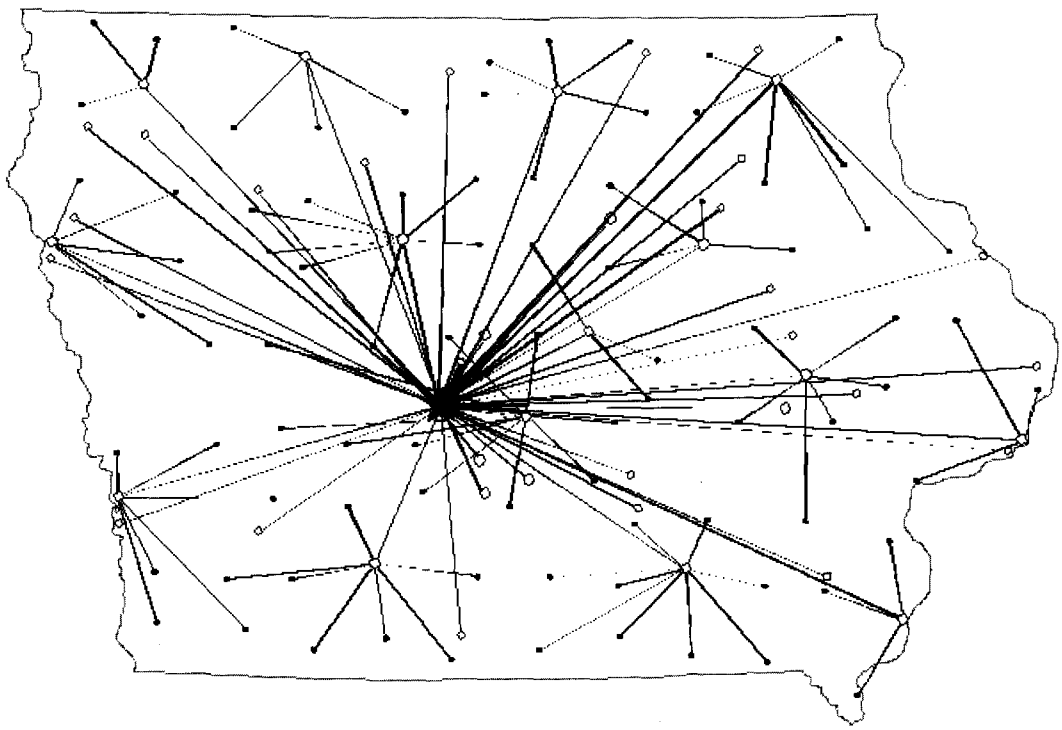
As the world of technology becomes more dynamic, so will the Iowa Communications Network. We will continually strive to make Iowa a leader in integrated technology aimed at improving the education, telemedicine and governmental services provided for the citizens of Iowa.

Sincerely,

Richard H. Opie

Richard H. Opie,
Chairperson
Iowa Telecommunications & Technology Commission

Iowa Communications Network



60,000 Sq. Miles Covered
Approximately 3,400 miles of state-owned fiber optic cable
Estimated 300 miles of leased fiber for Part III (FY 1996-97)

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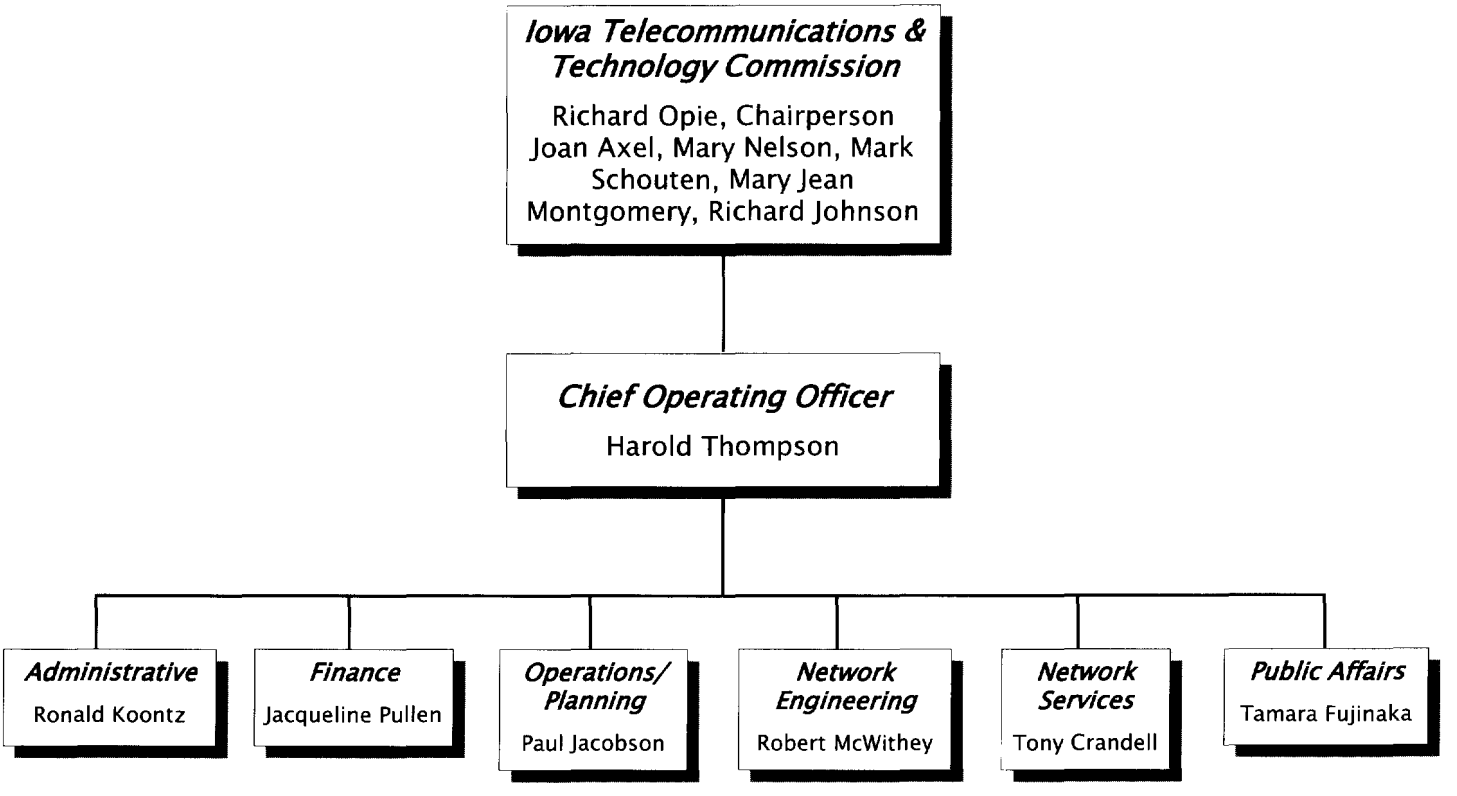
ICN Management Structure



Dear Friends of Iowa:

Richard H. Opie,
Des Moines
ITTC Chairperson
Retired

Mary Jean Montgomery,
Spencer
Consultant & Grant Writer,
Upper Des Moines
Opportunity Inc.

The Honorable
Richard D. Johnson,
Des Moines
State Auditor

Harold M. Thompson,
Johnston
Chief Operating Officer,
Iowa Communications

We are pleased to share the first Annual Report of the Iowa Communications Network with you.

The organization of the Iowa Telecommunications and Technology Commission was mandated as the administration of the ICN as determined in Senate File 2089 during the 1994 Legislative Session. This legislation also defined the basic mission of the Commission to be "guardians of the Network." The initial meeting of the Iowa Telecommunications and Technology Commission was in July of 1994. At that time the Commission consisted of three members and the State Auditor as an ex-officio member.

Since then, the Commission has accomplished a number of achievements which included the implementation of Part III of the Network. The Legislature passed and the Governor signed the four-year construction plan outlined in Senate File 2089. The Network is currently in its second year of construction which will connect 474 schools, libraries and area education agencies to the ICN.

The Commission analyzed information gathered by the HF 461 Task Force and recommended to the Legislature that it was not in the best interest of the state to contemplate selling the Network at the current time.

Six chapters of administrative rules for the Network were adopted during FY 1996. The remaining rules, currently being considered, are in the editing process.

In order to more concisely define the authorized users and uses of the Network, as determined in Chapter 8D of the Code of Iowa, the Commission has developed a task force of Iowans to research and evaluate the current plan. Iowans serving on the task force represent the various interests in the Network.

Advisory committees were formed to help the Commission stay on top of the various facets of the ICN. At least one member from the Commission interfaces with each committee. The committees include: Education Telecommunications Committee (ETC), Library Network Advisory Council, Telecommunications, Telemedicine and Telejustice.

During the 1996 Legislative Session the Commission membership was increased from three to five members with the State Auditor as an ex-officio member.

We look forward to the further development of applications by authorized users and will facilitate these uses by providing a network which can meet the requirements of its users into the next century.

Mary A. Nelson,
Des Moines
Vice President of Administration, Kemin Industries

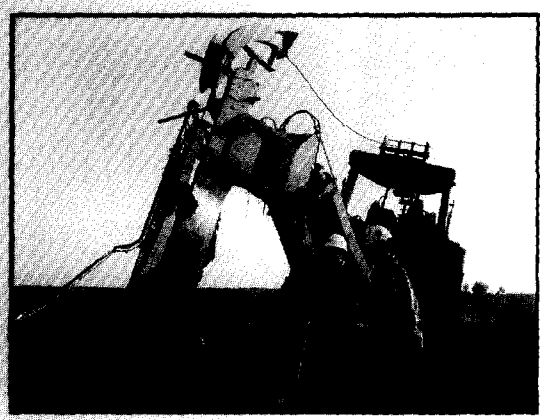
Joan U. Axel,
Muscatine
Attorney,Stanley Lande & Hunter

Mark Schouten,
Orange City
Sioux County Attorney,
Oostra Bierma & Schouten

Sincerely,

The Iowa Telecommunications & Technology Commission

The Early Years

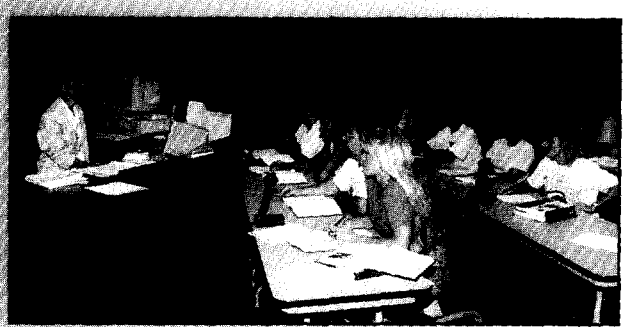


Construction workers break ground for the fiber to be placed during the beginning of the ICN construction.

ICN Users

Chapter 8D of the Code of Iowa specifically defines the authorized users of the Network. They include:

- All accredited K-12 school districts & private schools in the State
- All accredited public & private colleges & technical educational institutions
- All State Agencies
- All Federal Agencies
- The United States Post Office
- Hospitals and Physicians Clinics (video & data services only)
- Public and regional libraries



Kirkwood Community College in Cedar Rapids was a leader in the creation of the Iowa Communications Network.

Photo courtesy of Kirkwood Community College

The Iowa Communications Network (ICN) was developed to encourage efficiencies and provide distance learning users the capability of communicating with each other. The Iowa Legislative Council determined that coordinated statewide activity was needed in order for everyone to benefit from distance learning technologies.

Community Colleges in Iowa experimented with distance learning projects between 1980-1986. In 1987, the Iowa Legislature appointed Iowa Public Television (IPTV) to act as the coordinator for distance learning in Iowa through the use of the Narrowcast System Advisory Committee. The Legislature asked IPTV and the Department of General Services to develop a design plan for a statewide educational telecommunications network by January 1, 1989.

Through a series of plans and requests for proposals, a final plan for Parts I and II of the fiber optic network project was adopted and construction began in 1991. These two phases included 104 sites (one fiber optic endpoint per county, and an endpoint at each of the three state universities, Iowa Public Television, and the Capitol Complex). By early 1994, 49 sites were activated and the remaining 55 Network sites were activated that following fall and winter.

During the 1994 Legislative Session, a bill creating a governing structure and parameters for Part III of the Network was adopted. In that bill, the ICN became a separate department allowing assumption of the administrative duties from the Department of General Services and IPTV. In that same year, several other applications including telemedicine and telejustice were recognized as essential tools for economic resurgence in Iowa's rural communities and were added as authorized users.

Fiscal Year 1996 was the first year of the four-year Part III construction project. One hundred and three sites were scheduled for completion during the fiscal year. Due to unpredictable weather and other circumstances, eight of the 103 connections were not able to be completed until early FY 1997.

Imagine That!

The ICN is the world's largest full motion interactive video network.

The Early Years

The ICN was constructed as a tool to provide authorized users throughout the state, sufficient telecommunications capacity for voice, data, and two-way, interactive full motion video transmissions in an efficient manner on an equal access basis. The ICN has accomplished this by equitable pricing of services for users throughout the state. Iowans are using the Network at an increasing rate. From FY 1993 (partial year) to FY 1996 video usage has jumped from 26,000 hours to over 100,000 hours.

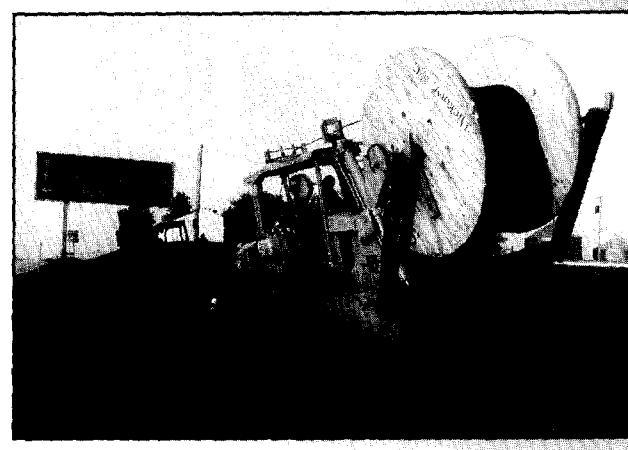
The Network was not initially built as an economic development tool. However, the ICN is a means by which medicine, K-12 and higher education, state agencies and other authorized users can provide more accessible services to local patrons. If the State of Iowa can demonstrate to companies looking for a location, that the same health, educational and governmental services found in urban areas are available in rural Iowa, many of the roadblocks to attracting new businesses to the state's rural areas will be eliminated.

The ICN also allows institutions of higher learning to offer four-year and masters degree programs to the citizenry of rural Iowa that, previously, could only be obtained by commuting, thus overcoming another rural roadblock.

The primary and most important function of the Network is to support K-12 education. Integration of technology in the learning process has two intended purposes. The first goal is to increase the learning of the student. The second goal hopes that integrated technology will motivate students to want to learn. Full motion, interactive classrooms bring access to advanced course opportunities that previously were reserved for the very large schools. Internet access brings the students into a new learning environment with the availability of unlimited information. Interactive computerized instruction opens the door to self-paced course work. The future brings virtual reality, training opportunities and other new 21st Century technologies to even the smallest school districts.

The Network

- DS-3 Synchronous Optical Network-(SONET)
- 3,400 miles of buried fiber optic cable
- Network provides a full DS-3 (45 megabytes of bandwidth) to each school district in the state



Fiber is being placed in the ground near a farmhouse in rural Iowa.

ICN Connects Iowa

In addition to the four-year Part III additions, other authorized users are connecting more sites to the Network:

- The National Guard added 46 total sites through its Community Lightways Project during Fiscal Year (FY) 1996.
- The Federal Government added 22 sites for conducting several pilot projects.
- Hospitals have 17 sites connected and have 6 more underway.
- State government added 13 sites in FY 1996.

ICN Across Iowa

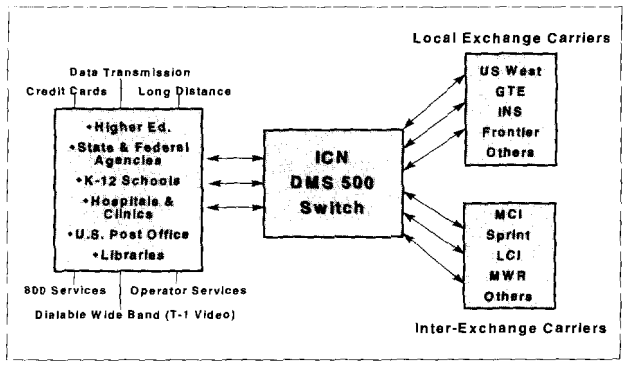
The ICN connects all 99 counties in the state and is within 20 miles of every citizen.

Services

Technology Behind the ICN
Full Motion Video
Dialable Wideband Video
Voice & Data
Internet

DMS 500 Switch

The ICN is able to offer authorized users the capability of receiving discounted rates for voice and data services in a more timely and efficient data processing system. The ICN also offers video service to hospitals and clinics, giving them the opportunity to use telemedicine as another resource in the field of medicine.



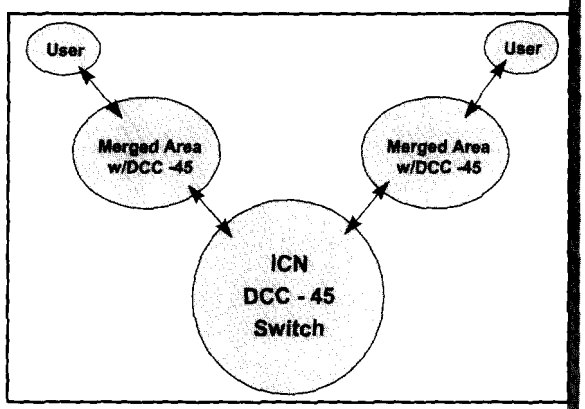
All this is possible because of a Digital Multiplex System (DMS) 500 Switch which was installed at the ICN in FY 1996. The DMS 500 is the heart of the ICN's voice, data and dialable wideband video services. Without this switch, the ICN would not be able to offer our users such efficient and inexpensive service.

The switch takes in traffic from the authorized user and then redistributes it to either a Long Distance (interexchange) Carrier such as MCI or Sprint or to a Local Exchange Carrier such as GTE or US West. (See diagram.) The ICN acts as an interface by bundling an unlimited amount of voice and data traffic into groups and then sending it to the designated vendor. By using the ICN to bundle all the traffic, authorized users are given a lower "high volume use" rate.

The DMS 500 also allows the ICN to offer a dialable wideband (T-1) video service. This type of video is compressed video. It uses a T-1 connection to transmit on image through digital channels. Dialable wideband video is a less expensive form of video transmission; however, it is less capable than full motion. The T-1 video service shows a clear picture but does not allow for the same level of synchronous movement as full motion video. Hospitals and clinics are utilizing the service for cardiology, radiology and pediatric consultations, to name a few applications. Physicians and specialists are able to view a patient on video and at the same time, read the vital signs on the data connection without having to travel long distances for a consultation.

DCC-45 Switch

The primary function of the ICN is to provide full motion video service for interactive distance learning. This service is provided by video circuits at the DS-3 (45 Megabytes) rate to each of the Network's DS-3 video classrooms. These video circuits are routed and switched by DCC-45 (Digital Cross Connect) switches within the network. Four of these switches are located within the network hub and are interconnected to act as one large central distribution switch. In addition, there is a DCC-45 switch located in each of the 15 educational merged areas of the state.



Together, these switches provide the largest video switching network in the world. The Network allows for connectivity between the ICN video classrooms on a one-to-one basis all the way up to a one-to-108 basis. The interaction of the video (switching) is triggered by the microphone or push-to-talk switches provided within each classroom.

One of the primary requirements of this broadband video service is that its switching time be kept to the very minimum to provide the most seamless interaction of the video for educational use. In spite of the ICN's very large size and complexity, the switching time has always been restricted to one half second regardless of the size of session connected.

Full Motion Video Services

Fibercaucus made its debut during the 1996 Iowa Caucus. The ICN made it possible for 32 sites throughout the state to participate in the caucus.

The video application, as it applies to distance learning, was one of the main reasons the network was built. In the early 1980's, several distance learning networks, with community colleges as their hubs, were being developed in Iowa. The state's educational visionaries determined that the most efficient way to equalize the educational resources available to students between urban and rural areas of the state was to build a statewide telecommunications network. The network would serve all schools in Iowa and would allow distance learning opportunities to students throughout the state.

The ICN began FY 1996 with 128 video sites and ended with 248 sites. The growth, in large part, was due to the addition of 46 National Guard armories, 90 K-12 schools, 13 area education agencies and one public library. State and federal agencies also added sites, as did private colleges, universities and community colleges.

Imagine That!

With full motion video, users can connect across the state with each other and not lose any quality in the transmission.

Iowa Plastics Industry

It is projected that Iowa will need over 300 plastic mold makers within the next five years. The ICN has teamed up with Kirkwood Community College and the Iowa Plastics Consortium to offer the first-ever Mold Builders Apprenticeship Program over the Network.

Ron Toyne, Director of Industrial Technology at Kirkwood Community College, sees Iowa becoming a leader in the plastics industry. "We wouldn't be able to do this without the ICN," stated Toyne. "We will be able to put skilled people into rural Iowa."

Full Motion Video Mission & Services

The purpose of offering video services to authorized users of the ICN is to equalize the services available to rural Iowans with those available to citizens in the urban centers. DS-3 video services with access points in rural schools, National Guard armories, state offices, community colleges, area education agencies and other locations have given rural Iowans a link to meetings, training, education, and professional peers that in the past have only been available with a lot of "windshield" time.

In FY 1996, Iowans located in pilot project areas received assistance from federal programs including Veterans Adminis-

Federal Court Savings

- As a result of an eight month test, the U.S. Marshal Service invested $227 for ICN costs.
- By using the ICN, they saved a total of $37,107 in salaries and per diem/travel costs.
- 25,300 employee travel miles were saved.
- 645 employee hours, which includes 85 over-night stays, were eliminated.
- A ratio of $1:$150 was saved through ICN use.

Full Motion Video Services

tration, Social Security Administration, Employment Assistance, and federal judicial offices and met with the officials located in Des Moines, Iowa City, or Davenport using the ICN.

Iowans located in any area of the state can take courses offered by community colleges, private colleges and Regents Institutions within 20 minutes from his/her home. Many professionals including attorneys and doctors receive updated training in their areas of expertise.

Also in FY 1996, the National Guard implemented its Lightways Community Project connecting 46 armories throughout the state. This allows Guard members to receive training and complete administrative details at their unit's home base rather than having to travel to Camp Dodge. Authorized users in Iowa communities benefit by being able to use the armory classrooms during the week and whenever the Guard members are not using them.

Future Services

The future of full motion video technology is constantly changing. One upcoming feature that will benefit most users will be on-line scheduling. It will enable the user to stay at his/her PC and schedule a session over the network rather than having to go through the area hub and have several people involved in the scheduling process.

This will affect the telemedicine programs that use the DS-3 full motion video classrooms. It will allow doctors to get on the Network more quickly, which could open doors for additional telemedicine applications.

Photo courtesy of the Spencer Daily Reporter

Degree at 60

John Rahn of Spencer recently received his Masters Degree after being out of school for 37 years. He attended classes at Drake University via the ICN connection at Iowa Lakes Community College.

Rahn said he watched a demonstration about the ICN at the Iowa Lakes Campus in 1994. "Using the ICN was more affordable and cut down on the travel time," Rahn commented. "The ICN really helps rural Iowa. It is just too hard to travel all the way to Sioux City or Sioux Falls for classes."

Rahn recently completed the two-year program and is now teaching business classes at two area community colleges.

Parole Board Savings

The Iowa Board of Parole saved 6,081 travel miles during FY 1996 by using the ICN. That gave them more time to spend on the cases and in their offices as opposed to being on the road.

During the same year, 22,666 miles were saved on revocation hearings held over the Network.

DHS Saves with ICN

The Iowa Department of Human Services (DHS) makes "house calls" to clients throughout the state. Those miles add up as does the time on the road.

By using the ICN, the DHS saved $132,473 in FY 1996. This includes the cost for productivity, lodging, meals, travel and other ICN costs.

The ICN allowed DHS workers to save 26,166 travel miles, one way. Ultimately, this is time saved that can be used for DHS clients.

Dialable Wideband Video Services

Case History

(This is a true case, however, names have been changed to maintain confidentiality.)

Joey Smith was born on March 18, 1996, at St. Joseph's Mercy Hospital in Centerville. Two days later, an odd rash appeared and spread over Joey's back, arms and legs. Because Dr. F. was unfamiliar with this rash, he placed a telephone call to a neonatologist, Dr. B. for advice.

Dr. F.'s oral description of the rash did not result in a conclusive diagnosis. The doctors agreed to evaluate the rash via telemedicine. Within four hours of the initial phone call to Dr. B., Joey was diagnosed as having Erythemia Toxicum, a common newborn rash. A skin biopsy was recommended by Dr. B. for confirmation of the diagnosis.

Joey was sent home with his parents later that day. By using the dialable wideband video for telemedicine, Joey's parents avoided a 160 mile round trip from Centerville to Des Moines, as well as a several day wait for an appointment to see the neonatologist.

Dialable Wideband Service

- It is the primary choice of telemedicine video users
- Dial-up connection makes on-demand scheduling convenient
- Quality of video is considered adequate for telemedicine applications

Federal agencies, the Iowa Board of Parole, hospitals throughout rural Iowa and many other ICN users are utilizing the dialable wideband video service. The service offers video teleconferencing capability at a lower speed of transmission using the DMS 500 Switch (see page 13). Users' costs and often travel time are significantly reduced which, in turn, is a benefit for their customers.

Dialable Wideband Mission & Services

The ICN offers dialable wideband video service to its users as an economical means of video teleconferencing. The lower quality video enables the ICN users to conduct video sessions but the image in the monitor is not "real time." Hospitals and clinics utilize this service to conduct telemedicine consultations between general practitioners and specialists because they only need to see a "still" picture of the patient and in many cases do not need the full-motion video to conduct consultations. Patients at rural hospitals and clinics are able to work with his/her own doctor and still have a consultation with a specialist. Travel and time are saved by using the dialable wideband video service; which ultimately leads to better medical support and more lives saved.

Few states in the nation have full-motion video capability. Therefore, Iowa offers this lower quality video in order to continue teleconferencing between states. For example, Mercy Medical Center in Des Moines is able to consult with Mayo Clinic in Rochester, Minnesota with out traveling hundreds of miles. Federal agencies also utilize the dialable wideband video to communicate with each other.

Parole hearings are made easier for senior Parole Board Judge James Twedt. He no longer has to travel hundreds of miles to conduct a parole interview or hearing. Victims also

Dialable Wideband Video Services

benefit from the dialable wideband video. They no longer have to travel long miles to sit in a courtroom next to the inmate's family. The victim may stay near his/her home and in a protected, more comfortable atmosphere.

This service not only cuts down travel time for users, but also allows them the advantage to "dial-up" just prior to the consultation or meeting, rather than scheduling the ICN room weeks in advance for a full-motion classroom.

A Des Moines dermatologist (front left) reviews a facial rash (in monitor at right) using the ICN's dialable wideband video during a recent telederma-tology clinic.

Future Services

Currently the ICN is developing a personal computer (PC) based video program which will allow for three images to be placed on a screen at once: the image of a person at his/her work station, a document and a computer "chalk board." Control of the document can pass from user to user, allowing "real-time" changes. This technology is here now using the Integrated Services Digital Network (ISDN) technology platform. The product is currently being tested by several state agencies and is an appropriate tool at the management level. This technology may have applications in various areas including telemedicine. The product should be available to authorized users during FY 1997. This is rated as medium quality video with a processing speed of 30 frames per second.

Another product with PC video capabilities which is being tested is frame relay video. This product is rated as lower quality video with a processing speed of 1-15 frames per second, depending on the demand of the frame relay circuits and the type of PC used. It has the same application sharing capabilities as the ATM video, but with lower video quality, and at a lower cost. Currently the two PC based video applications are not able to converse, but software is being created to allow sharing.

Dialable Wideband Features

- Point to point or conference options
- Point to point offers needed privacy
- Caller chooses the bandwidth desired (1 to 23 channels)
- Caller has control of the cost based on bandwidth used